R E M A R K S

A 3 month extension of time until January 10, 2003 was previously obtained. In the Office Action, Point 1, with respect to the IDS, one reference was not considered because of lack of a date. The publication date has now been added to the listing in the PTO-1449 sheet 1 of 2 for consideration of the non-considered reference by the Examiner. The IDS fee is presented therefor.

Correction of the drawings was required as set forth in Point 3 of the Office Action, the correction now being made herein by adding further reference numerals to the drawing figures with corresponding changes being made in the specification.

Correction was required in the specification of grammatical and idiomatic errors. Following the Examiner's suggestion which is highly appreciated a substitute specification is presented correcting the grammatical and idiomatic errors, is in compliance with 37 CFR 1.52(a) and (b) and conforms to the proposed drawing correction presented herewith. No new matter has been added.

Objection was made to the claims as set forth in Point 6 of the Office Action, and the claims where rejected further under 35 U.S.C. 112 and 101 as set forth in the Office Action. All of the claim 1-6 were rejected under 35 U.S.C. 102 as being anticipated by Kobayashi et al, US 5,853,328, Miyake, JP 61-201918, Tampier, FR 761,431, Kohli et al, US 4,806,068, Parker, US 2,124,006, Hendrickson, US 1,149,762, and Pritschow et al, US 5,916,328 (see pages 7 and 8 of the Office Action). Reconsideration of these

rejections is requested respectfully in view of the amendment and the argument herein.

In accordance with a distinctive feature of the present invention, there is a positioning of the two supports, or spherical bearings, relative to each other to provide a robotic output in the positioning of an arm segment (of the robot) extending from one of the supports and in the directing of the arm segment by the support, or spherical bearing, relative to a rod which interconnects the two supports. The rod extends along an axis established by the two supports.

In contrast, in the teachings of the cited art, (1) a rod is used to constrain position and/or motion of spherical bearings, or the output is the position or motion of bearings (US 5,853,328, and US 1,149,762); (2) a rod is used as an output and not to define position and direction but for purposes of stabilization of the rod (JP 61-201918); and (3) the position of a rod is not used as an output directly (US 4,806,068). Thus, each of the foregoing references fails to disclose or suggest the method and mechanism of the present invention.

With respect to the individual references, the following is noted. Kobayashi relates to a power transmission device and a constant velocity universal joint to absorb vibration or movement of an engine of an automobile. Though there is disclosure of an inner and an outer member which are movable axially relative to each other, there is no disclosure of two spherical bearings which can travel relative to each other, such that the motion of

one bearing along the axial rod is constrained and the motion of the other bearing along the is enabled.

Miyake relates to bearing apparatus having a rotating axis and two bearings supporting the rotating axis at both ends thereof. The two bearings cannot travel. The rotating axis is to be fixed at its home position and is not intended to travel for establishing position and direction.

Tampier relates to a transmission mechanism having a rotating axis and two bearings supporting the rotating axis at both ends thereof. The two bearings cannot travel. The rotating axis is held fixed and is not intended to travel for establishing position and direction.

Kohli relates to a rotary linear actuator for use in robotic manipulators having a splined shaft supported at its opposite ends by a pair of bearings. However the bearings cannot travel. The shaft is held fixed and is not intended to travel for establishing position and direction.

Parker relates to a gauge supporting arm system in a dial test indicator having an axial rod and two supports. However, the supports to the support the axial rod, and the axial rod is not intended to travel for establishing position and direction.

Pritschow relates to a device for moving a body in space, and having a rod-shaped body with two bearings, wherein an end point of the body determines the orientation of the rod body. But

there is a teaching that the position of one of the bearings relates to the position of the other of the bearings.

The foregoing teachings of the cited art are contrary to the practice of the present invention wherein a rod or shaft interconnects two spherical bearings, wherein a first of the bearings is fixed to the rod and the second of the bearings can translate along the rod relative to the first bearing, and wherein the second bearing enables a positioning and an orientation of a segment of a robotic arm relative to the first bearing and to the rod.

Accordingly, it is believed that the amendment of the present claims overcomes the foregoing rejections to obtain allowable subject matter. The new claims are presented for further definition of the invention, and are believed to be allowable in view of the foregoing argument.

Enclosed is a Request for Drawing Correction Approval and submission of proposed drawing corrections, shown in red ink, for Figs. 2, 3 and 4 to meet the Examiner's requirement for correction of the drawing.

Deposit account Charge forms are present to cover the Government fee in the amount of $84.00 for 1 extra independent claim in excess of three independent claims

In the event there are further issues remaining the Examiner is respectfully requested to telephone attorney to reach agreement to expedite issuance of this application.

All of the claims are believed to be allowable in view of the foregoing argument.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned "Version with markings to show changes"

Since the present claims set forth the present invention patentably and distinctly, and are not taught by the cited art either taken alone or in combination, this amendment is believed to place this case in condition for allowance and the Examiner is respectfully requested to reconsider the matter, enter this amendment, and to allow all of the claims in this case.

Respectfully submitted,
Kiyoyuki Chinzei

by: _____
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CERTIFICATE OF MAILING UNDER 37 CFR SECTION 1.8(a)

I hereby certify that the accompanying Amendment, Request for Drawing Correction Approval, Substitute Specification and Deposit Account Charge are being deposited with the United States Postal Service as first class mail in an envelope addressed to the Commissioner of Patents & Trademarks, Washington, D.C. 20231, on January 8, 2003.

Dated: January 8, 2003

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USA Patent Application
Kiyoyuki Chinzei
Serial No.: 09/749,125
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LINK MECHANISM TO DETERMINE
THE POSITION AND DIRECTION
Examiner: Greg Binda
Group art unit: 3679

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

1. (Amended) A link mechanism [to determine] for establishing the position of a second spherical bearing of the mechanism relative to a first spherical bearing of the mechanism, and for establishing the direction, relative to a rod of the mechanism, of an arm segment extending from said second bearing, the link mechanism comprising:

[an axial] said rod; and

[two] said first and said second spherical bearings [to support the] attached to said [axial] rod, said two spherical bearings being capable of changing positions relative to each other along said rod,

wherein [the] motion of one of said two spherical bearings relative to said [axial] rod along [the] an axis of the rod is constrained, and the other of said spherical bearings can travel along said [axial] rod.

2. (Amended) A link mechanism [to determine the position and the direction] according to claim 1, wherein the position of the second bearing and the direction of said [axial rod] arm segment are [determined] defined by [defining the] coordinate values of [the] one of said two spherical bearings and the position of the other of said two spherical bearings relative to the one of said two spherical bearings.

3. (Amended) A link mechanism [to determine the position and direction] according to claim 1, wherein the link mechanism is a part of a robot arm [, in particular, the end effector].

4. (Amended) A link mechanism [to determine] for establishing the position of a second support of the mechanism relative to a first support of the mechism, and for establishing the direction, relative to a rod of the mechanism, of an arm segment extending from said second support, the link mechanism comprising:

[an axial] said rod; and

[two] said first and said second supports [to support the] attached to said [axial] rod, said two

supports being capable of changing positions relative to each other along said rod,

wherein [the] motion of one of said two supports relative to said [axial] rod along [the] an axis of the rod is constrained, and the other of said supports can travel along said [axial] rod.

5. (Amended) A link mechanism [to determine the position and the direction] according to claim 4, wherein the position of the second support and the direction of said [axial rod] arm segment are [determined] defined by [defining the] coordinate values of [the] one of said two supports and the position of the other of said two supports relative to the one of said two supports.

6. (Amended) A link mechanism [to determine the position and the direction] according to claim 4, wherein the link mechanism is a part of a robot arm [, in particular, the end effector].